

CLAIMS

1. A DC-DC converter comprising:

a transformer having primary side terminals, secondary side terminals, a primary side winding, and a secondary side winding  
5 and determining a voltage converting ratio;

switching means interposed between said primary side terminals and said primary side winding; an LC resonant circuit having a resonating reactor connected in series with said switching means, and a resonating capacitor that resonates with said resonating  
10 reactor; and

driving means for turning said switching means ON/OFF, wherein:

resonant frequency detecting means for detecting a frequency of a resonant current caused by an operation of said LC resonant circuit and means for feeding the frequency detected by said resonant  
15 frequency detecting means back to said driving means are provided; and

said driving means turns said switching means ON/OFF at a resonant frequency of said LC resonant circuit based on the frequency detected by said resonant frequency detecting means.

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2. The DC-DC converter according to claim 1, wherein said resonant frequency detecting means is provided on the primary side of said transformer.

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3. A bi-directional DC-DC converter comprising:

a transformer having low-voltage side terminals, high-voltage

side terminals, a low-voltage side winding, and a high-voltage side winding and determining a voltage converting ratio;

low-voltage side switching means interposed between said low-voltage side terminals and said low-voltage side winding;

5 high-voltage side switching means interposed between said high-voltage side terminals and said high-voltage side winding;

a low-voltage side rectifying element connected in parallel with each of switching elements in said low-voltage side switching means;

10 a high-voltage side rectifying element connected in parallel with each of switching elements in said high-voltage side switching means; and

driving means for turning the switching elements ON/OFF in said low-voltage side switching means and the switching elements  
15 in said high-voltage side switching means, wherein:

an LC resonant circuit is interposed between said high-voltage side winding and said high-voltage side switching means or between said low-voltage side winding and said low-voltage side switching means;

20 resonant frequency detecting means for detecting a frequency of a resonant current caused by an operation of said LC resonant circuit and means for feeding the frequency detected by said resonant frequency detecting means back to said driving means are provided; and

25 said driving means turns said switching means ON/OFF at a resonant frequency of said LC resonant circuit based on the frequency detected

by said resonant frequency detecting means.

4. The DC-DC converter according to claim 3, wherein said  
LC resonant circuit is interposed between said high-voltage side  
5 winding and said high-voltage switching means.

5. The DC-DC converter according to claim 3, wherein said  
low-voltage side switching means and said high-voltage switching  
means are each configured by interconnecting four switching elements  
10 in a bridge.